

1 WE CLAIM:

2 1. A method of collecting data for a geographic database that represents  
3 roads in a geographic region, the method comprising:

4 with a vehicle that travels along the roads, using a barometer associated with the  
5 vehicle to collect data indicating altitudes as the vehicle travels along the roads;  
6 analyzing said altitude data;  
7 based on said analyzing, deriving road grade data along said roads; and  
8 storing data in said geographic database that represent road grade.

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10 2. The method of Claim 1 wherein said road grade data indicates a location  
11 of a road grade change point.

12  
13 3. The method of Claim 1 wherein said road grade data indicates a direction  
14 of the road grade.

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16 4. The method of Claim 1 wherein said road grade data indicates a section of  
17 constant road grade along the road.

18  
19 5. The method of Claim 1 wherein said road grade data indicates a road  
20 grade value.

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22 6. The method of Claim 1 further comprising collecting data indicating  
23 positions of the vehicle as the vehicle travels along the roads.

24  
25 7. The method of Claim 1 further comprising:  
26 identifying a change in altitude value between consecutively collected altitude  
27 data exceeding a threshold amount.

1           8.     The method of Claim 7 wherein said change in altitude corresponds to a  
2 change in window position associated with the vehicle.

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4           9.     The method of Claim 7 wherein said change in altitude corresponds to a  
5 change in operation of an air conditioning unit associated with the vehicle.

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7           10.    The method of Claim 1 further comprising:  
8 filtering the altitude data to remove outlier data.

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10          11.    The method of Claim 1 wherein the vehicle is a probe data collection  
11 vehicle that collects data while traveling in the geographic region for purposes other than  
12 data collection.

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14          12.    A method of obtaining data for a geographic database using a vehicle  
15 moving on roads in a geographic region comprising:  
16 collecting data indicating atmospheric pressure and position of the vehicle as the  
17 vehicle travels on roads in the geographic region;  
18 analyzing the atmospheric pressure data and the position data to identify a section  
19 of constant road grade along the road traveled by the vehicle; and  
20 updating the geographic database to indicate the section of constant road grade.

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22          13.    The method of Claim 12 wherein the atmospheric pressure data is  
23 obtained from a barometer associated with the vehicle.

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25          14.    The method of Claim 12 further comprising identifying a direction of the  
26 road grade.

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28          15.    The method of Claim 12 further comprising identifying a road grade  
29 change point.

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1           16.     The method of Claim 12 further comprising identifying a road grade value  
2     for the section of constant road grade.

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4           17.     A system for collecting data for a geographic database that represents  
5     roads in a geographic region comprising:

6                 a data collection unit located in a vehicle that travel along the roads in the  
7     geographic region;

8                 a barometer associated with the vehicle, said barometer providing altitude data to  
9     said data collection unit;

10                a positioning system associated with the vehicle, said positioning system  
11     providing position data to said data collection unit; and

12                a data processing unit analyzing said altitude data and said position data, based on  
13     said analyzing, inferring road grade data along said roads.

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15           18.     The system of Claim 17 wherein said data processing unit is located in a  
16     data collection facility.

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18           19.     The system of Claim 17 wherein said data collection unit receives data  
19     from a navigation system associated with the vehicle.

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